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AUTHOR	Lackney, Jeffery A.
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ABSTRACT

This paper discusses environmental preference, particularly related to the design of children's museums. It explains that preference for an environment leads to motivation to interact with the environment, which leads to learning. It lays out several design principles: (1) involve children in the process of children's museum design in a way that goes beyond tokenism and captures children's environmental preferences; (2) provide diverse levels in complexity of size, shape, color, and textures of learning environments to appeal to the broadest range of preferences in children; (3) provide clear connections between indoor and outdoor learning environments through the use of windows, functional covered porches, and other transitional strategies to accommodate preference for outdoor spaces; (4) provide a coordinated range of colors in indoor designed environments that reflects as much as possible the natural environment; (5) provide access to natural daylight through windows, skylights, full-spectrum lighting, and especially through direct access to natural daylight by the use of outdoor learning spaces; (6) provide increased levels of fresh air intake and increased ventilation rates in buildings, and provide operable windows for occupants to vary the rate of ventilation for comfort; (7) provide resource-rich activities within well-defined spatial configurations to facilitate desired learning behaviors; and (8) provide learning environments that are physically open-ended and composed of "loose parts" to encourage exploration, discovery, and experimentation appropriate for all developmental ages. (EV)

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Learning Environments in Children's Museums: Aesthetics, Environmental Preference and Creativity

Jeffery A. Lackney, Ph.D., A.I.A.

Paper presented at "Beauty, Creativity and Sensory Delights". Interactivity 2000: Creativity in Civil Society. Association of Youth Museums & Institute for Civil Society. Baltimore, Maryland, May, 2000.

Aesthetics and Environmental Preference

We know that pleasure is related to moderate level of stimulation, it makes people feel better, it increases people's willingness to help each other, and it increases the willingness to talk to one another.

Preference = Beautiful

Preference for an environment leads to motivation to interact with environment which leads to learning. Environmental preference is also linked to successful adaptation.

The Ecology of Children's Environments

Environmental experience is limited and controlled by a variety of social, cultural and physical factors. These factors interact with each other and the child's personality in a complex ecological process of growth and development.

All these elements are ecologically controlled by man-made institutions. The most influential are those with direct influence over the quality of child-environment interactions such as family, school, housing industry, local government, and the planning and design professions. Often, these institutions have goals of their own that are counter to the goals of children.

The present emphasis on "safety first" and the provision of safe environments is an example of how institutions unintentionally limit the creative behavior of children in our society. Child care centers routinely limit children's experience of the outdoors to 30 minutes a day. Many urban neighborhoods are to too unsafe for parents to allow their children to roam further than the backyard fence. Schools limit the ability of teenagers to

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leave campus during the school day, while city governments outlaw natural teenage hangouts on street corners.

Roger Hart, an environmental psychologist at the City University of New York has concluded that research on children's play for the most part pays little attention to places actually used by children. Most research looks at environments created by adults for children. Research tends to evaluate the degree to which adult (institutional) goals are achieved in the service of children. There is a lesson in there I think for the designers and managers of children's museums.

Design Principle #1: Involve children in the process of children's museum design in a way that is goes beyond tokenism and captures children's environmental preferences.

Gender Differences in Environmental Preference

Gender differences exist in the spatial behavior. Boys and girls experience different exploratory opportunities use different strategies for exploration. Socialization practices encourage and favor boys' expansion of spatial awareness and knowledge, while restricting spatial development in girls. Girls demonstrate stronger preferences for more diverse and dramatic environmental stimuli than boys.

Faced with limited resources, a school district's first option is to look at the feasibility of altering its existing facilities.

Design Principle #2: Provide diverse levels in complexity of size, shape, color and textures of learning environments to appeal to the broadest range of preferences in children.

Preferences for Outdoor Open Space

Children's preference for outdoor open spaces is well documented. American children prefer outdoors to indoors, and in particular open spaces like lawns and playgrounds. However, children may spend as much as 90% of their childhood indoors. What impact might this have on children?

My colleague Paul Jacobs at MSU has anecdotally challenged this finding for child preferences for outdoor spaces. He finds that these children, who he refers to as the "freon generation", prefer to stay inside where its comfortable and where Nintendo awaits.

Freon gas generation aside, there may be several reasons for children's preference for the outdoors that may be related to Stephen Kaplan's theory linking environmental preference and evolutionary adaptation.

William Hathaway, a Canadian researcher, argues that we find ourselves surrounded by walls, floors, and ceilings covered with colors that are seldom repeated on the same scale in nature. These colors are usually perceived under lighting systems designed more for efficiency than for their possible effects on people. Our lighting systems can only simulate twilight levels of illumination. Our buildings are filled with stagnant and still air that doesn't move freely to disperse odors and pollutants and doesn't flow through vegetation where it can become oxygen enriched or move over water where it can pick up humidity.

No wonder children prefer outdoors to indoors. Indoor environments have been poorly designed. Is it possible to design indoor settings that reflect the positive attributes of the natural environment?

Design Principle #3: Provide clear connections between indoor and outdoor learning environments through the use of windows, functional covered porches and other transitional strategies to accommodate preference for outdoor spaces.

Color Preferences

There isn't enough time in this presentation to cover the impact of the physical environment on children's behavior. We can talk briefly however about some of the research concerning color, light and air quality.

Under experimental laboratory conditions, color has been found to affect changes in mood and emotional state, psychomotor performance, muscular activity, rate of breathing, pulse rate and blood pressure. Hathaway argues that blue skies and green vegetation and earth tones are part of our natural environment and it is therefore should not be a surprise that these colors have been found to have a calming effect. It seems reasonable to assume then that people feel most comfortable and relaxed in environments that simulate natural conditions. Along with these research findings on color, I have the responsibility of informing you that other researchers (including this one) believe that color research is plagued with confounding variables such as culturally learned symbolic associations, such as red = hot, blue = cold.

Design Principle #4: Provide a coordinated range of colors in indoor designed environments that reflect as much as possible the natural environment.

Light Quality

Light can have a number of effects on humans in addition to its relationship to vision. We have known for some time that environmental lighting exerts profound biological effects on humans such as mood and biological rhythms. Within the context of children's environment research, lighting has been found to have important effects on attendance, growth and physical development.

In a typical study testing differences between full-spectrum lighting and cool white fluorescent lighting commonly used in institutional settings, it was found that physiological measures indicated that most subjects showed less fatigue after a study session in natural light than in a traditionally illuminated instructional environment.

Design Principle #5: Provide access to natural daylight through windows, skylights, full-spectrum lighting, and especially through direct access to natural daylight by the use of outdoor learning spaces.

Air Quality

We don't often think of air as a component of an aesthetically pleasing environment, but air quality can have a dramatic effect on our comfort and health which will effect our environmental preferences.

Air quality is another environmental factor that can have an effect on children's health. The thermal 'tightening' of buildings for energy conservation in the 1970s may be one of the causes of a variety of pathogenic factors in children in so called 'sick' school buildings. As a result of thermal tightening of buildings, the level of contaminants rise creating a polluted indoor air environment.

Children in 'sick buildings' have been found to exhibit clear signs of sensory irritation, skin rashes, and mental fatigue - all factors with the potential of decreasing the ability of students to learn.

Design Principle #6: Provide increased levels of fresh-air intake and increased ventilation rates in buildings, and provide operable windows for occupants to vary the rate of ventilation for comfort.

Spatial Quality

Along with environmental factors, spatial factors can influence child behavior as well.

My colleague Gary Moore at the University of Wisconsin-Milwaukee found that well-defined spatial definition has been found to predict a range of children's cognitive and social behaviors. Research has found significantly more exploratory behavior, more

mature social interactions and greater interpersonal cooperation occurred in spatially well-defined behavior settings in contrast to moderately or poorly defined settings.

Partitioning of space facilitates both peer and verbal interaction as well as fantasy, associative and cooperative play, while other research suggests that appropriate physical classroom arrangement encourages children to explore, interact, cooperate, read and speak more.

One researcher has observed children placed in both spatially planned rooms, and rooms designed to reflect a random spatial arrangement. Spatially planned rooms carefully arranged according to pragmatic criteria such as placing the water table near the sink and designed to promote specific learning outcomes. Children in spatially planned rooms were observed to engage in more manipulative activities than their peers in a room designed to reflect a random spatial arrangement. Moreover, they produced more complex shape, color, and number patterns using varied classroom materials such as beads, pegboards and unit blocks. Conservation skills were also enhanced and acquired earlier and by a greater number of children in the spatially planned rooms.

Design Principle #7: Provide resource-rich activities within well-defined spatial configurations to facilitate desired learning behaviors.

The Role of Play in Learning

The role of play in learning is underestimated. Many educators think of play as "burning off steam" which is one very important outcome of play. But, from research we know that the relationship of play to learning is unmistakable. Play activity has great significance for children, and serves as an important vehicle for learning about the world.

As Robin Moore of North Carolina State University, an expert in children's play, suggests, over the course of time, the child's playful interaction with the environment produces a feeling of environmental competence. This competence produces a sense of mastery and control over the environment in a child who utilizes it to achieve her goals and enrich her experience.

Do our designs of children's environments provide an adequate opportunity for children to experience environmental competence and enrich their experience?

A primary goal of in the design of any children's museum is to support exploration. Children's motivation to interact with their environment universal and intrinsic, however the quality of these interactions is dependent upon the possibilities for engagement that the environment affords. The physical environment becomes the curriculum, as much as books, toys, and work sheets and its manipulation by teachers becomes an essential aspect of the educational process.

Research suggests a strong link between literacy, play and the physical environment. Studies have demonstrated links between the types of play and elements of literacy development. Dramatic play for instance improves story comprehension and production by helping children better understand story structure, which then helps improve recall and production of story narratives. Including reading and writing materials in dramatic play areas can stimulate voluntary literacy behaviors.

Design Principle #8: Provide learning environments that are physically open-ended and composed of 'loose parts' to encourage exploration, discovery and experimentation appropriate for all developmental ages.

Conclusions

The design of children's museums must then take as a starting point what we know about environmental preference of children as has been presented in the previous section. Some researchers assert that environmental designers do not sufficiently weigh the preferences or concerns of children and parents. The reasoning that goes into play space design often involves untested assumptions about the nature of children and adults.

Museum design must take into consideration the ecology of children's environments: institutional/organizational goals, social environment, physical setting (built or natural), the child and their behavior (social, play) and the outcome learning experience. As the research demonstrates, the design of an aesthetically pleasing physical environment can have a dramatic effect on the other components of this ecology.

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